HIGHLIGHTS OF EGG QUALITY INVESTIGATIONS

by
Edmund H. McNally, Joseph P. Quinn and Marlow W. Olsen
Agricultural Research Administration
Bureau of Animal Industry

Since diet, heredity, and environment affect egg quality, the egg studies at the National Agricultural Research Center, are carried on in the poultry nutrition, genetics, and physiology investigations. Highlights of some of the interesting phases of these investigations are shown in the Bureau of Animal Industry exhibit at the 1949 Fact Finding Conference at Kansas City, Missouri.

DIET AND YOLK COLOR

It is generally recognized that intensity of yolk color is directly affected by the amount of pigment in the diet. The center chart shows yolk color variations on a restricted pigment diet and a normal diet. Note the wide variations on the normal diet. The two outside panels show yolk discolorations caused by ingredients of the diet.

Acorns contain an unknown substance which produces a greenish or olive-colored yolk. This greenish-yellow pigment begins to be deposited in the yolk within 3 to 4 days after the hens eat acorns. The green yolk is readily discernible under the candle, as shown in chart 1. Such green-yolked eggs do not hatch as well as eggs with yellow yolks. Some birds eat large quantities of acorn meats and hulls, both of which carry the yolk discoloration factor. Three species of acorns have been tested, all of which produced green yolks.

A high level of cottonseed meal will also cause yolk discoloration, if the eggs are stored, as shown in charts 4 and 5. A moderate amount of cottonseed meal in the ration, however, has no effect on fresh eggs or on eggs for hatching. Chart 5 shows variations in yolk colors between hens on the same level of cottonseed meal, indicating that the individuality of the bird may affect the amount of pigment deposited in the yolks of stored eggs. The ability of individual birds to deposit varied amounts of yellow pigment in the yolks of fresh eggs may also be inherited.

SHELL STRENGTH IS INHERITED

From White Leghorns of a common origin two lines of birds have been developed, which produce eggs differing widely in shell strength. In the poor-shell line, over three times as many eggs were broken, in routine handling, as in the good-shell line. The two lines were developed by selection based on loss in egg weight, an excellent measure of shell quality, and a heritable characteristic, as shown in the first breeding chart. The egg-weight loss method should be used to select breeders, which lay strong-shelled eggs throughout the summer as well as in the winter.

KEEPING QUALITY OF THICK WHITE INHERITED

Within the egg, a firm, non-deteriorating thick white is essential to furnish support and protection to the yolk. Exposure to heat soon liquefies the ordinary type of thick white, and causes it to dissolve into the thin white. An egg keeps better when the thick white is resistant to heat and other deteriorating influences. A heat-resistant thick white has been developed in a flock of

White Leghorns by 7 years of breeding. This thick white maintains most of its original firmness for 14 days at 100° F., a marked improvement over the ordinary thick white, which retains its initial quality for only a very short period.

STORAGE TEMPERATURES AFFECT HATCHABILITY

The hatchability of hen's eggs held at different temperatures is shown in 3 charts. Groups of 950 hatching eggs, 1 to 5 days old, were stored for 2 to 4 days, and for 6 to 8 days, prior to incubation, at temperatures of 30, 40, 50, 60, and 70° F. The highest hatchability, 81.5 percent, was obtained from the group stored from 2 to 4 days at 50° F. The lowest hatchability, 57.9 percent, was obtained from eggs stored at 30° F. In the 6 to 8 day group, the highest hatchability, 78.6 percent, was also obtained from eggs stored at 50° F. Holding eggs at 30° F. caused a drastic reduction in hatchability.

To further test the effect of storage temperatures, two groups of eggs were held for longer periods, ranging from 7 to 42 days. The holding temperatures were 50° F. and 55° F., respectively. There was little difference in the hatchability of the two groups for the first 21 days of storage. However, after 28 days of storage, eggs held at 55° F. showed a marked decline in hatchability. For best results, hatching eggs should not be held longer than one week, at 50° to 55° F.

EGG GRADING CHARTS AND CONSUMERS GUIDE

New color charts have been developed by the Poultry Branch of the Production and Marketing Administration. One of these charts illustrates minimum specifications for candling standards of quality and broken-out appearance of individual eggs. The other is a consumer chart in color showing the six weight classifications, and broken-out and cooked eggs representing the four standards of quality. To supplement this color chart, a four-page folder "Consumer Guide for Buying and Keeping Eggs" is distributed with it.